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Reteaching

6.1 Solving Inequalities

◆ **Skill A** Solving inequalities that contain addition and subtraction

Recall **Subtraction Property of Inequality:** If equal amounts are subtracted from the expressions on each side of an inequality, the resulting inequality is still true.

Addition Property of Inequality: If equal amounts are added to the expressions on each side of an inequality, the resulting inequality is still true.

◆ **Example 1**

Solve the inequality $x + 4 < 14$.

◆ **Solution**

$x + 4 < 14$	
$x + 4 - 4 < 14 - 4$	Subtract 4 from each side of the inequality.
$x < 10$	Simplify.

◆ **Example 2**

Solve the inequality $x - 7 > -13$.

◆ **Solution**

$x - 7 > -13$	
$x - 7 + 7 > -13 + 7$	Add 7 to each side of the inequality.
$x > -6$	

Solve each inequality.

1. $x - 17 > 43$ ____________
2. $11 \leq m - 14.5$ ____________
3. $-8 + m \geq -7$ ____________
4. $a + 4 < -4$ ____________
5. $z + 1 \leq 5$ ____________
6. $-3 \geq b + 11$ ____________
7. $x + (-8) > 22$ ____________
8. $10 \geq -3 + b$ ____________
9. $y - 18 > -3$ ____________
10. $255.6 + s > 322.7$ ____________
11. $z + 9\frac{1}{2} \leq 3\frac{2}{3}$ ____________
12. $x - 44,500 > 16,950$ ____________

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◆ Skill B Writing inequalities to represent a given situation

Recall **Statements of inequality**

a is less than *b*.	$a < b$
a is greater than *b*.	$a > b$
a is less than or equal to *b*.	$a \leq b$
a is greater than or equal to *b*.	$a \geq b$
a is not equal to *b*.	$a \neq b$

◆ **Example 1**

Write an inequality to represent the temperature, *T*, on a day when the high temperature for that day is 95°F.

◆ **Solution**

$T \leq 95$; the temperature was less than or equal to 95°F throughout the day.

◆ **Example 2**

Write an inequality to represent the humidity, *H*, on a day when the humidity reached a high of 68% by midafternoon and dropped to a low of 34% by nightfall.

◆ **Solution**

$0.34 \leq H \leq 0.68$; the humidity was between 34% and 68% throughout the day.

13. The maximum possible bowling score for two games is 600 points. If Ed never scores below 100 points for any game, write an inequality to describe his total score, *S*, for two games.

____

14. A classroom can seat a maximum of 30 students in 6 rows, with 5 desks in each row. On the first day of school, all of the front desks are occupied, but the classroom is not full. Write an inequality that models this situation. Use *S* as the number of students present on the first day of school.

____

15. The scores on a test range from 45 points to 99 points. Write an inequality that represents what one of the scores, *S*, might be.

____

16. Sylvia is a salesperson at a shoe store. This week Sylvia sold 9 pairs of shoes on Monday, which was her slowest day of the week. She sold the most shoes on Friday when she sold 23 pairs. Write an inequality that uses *S* to represent the number of pairs of shoes that Sylvia sold on Wednesday.

____

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Reteaching
6.2 Multistep Inequalities

◆**Skill A** Solving one-step inequalities

Recall When multiplying or dividing each side of an inequality by the same negative number, reverse the sign of the inequality.

◆ **Example**

Solve each inequality.

a. $x - 12 > 8$ **b.** $\frac{x}{-2} \leq 5$ **c.** $-3x \geq 21$

◆ **Solution**

a.
$$x - 12 > 8$$
$$x - 12 + 12 > 8 + 12$$
$$x > 20$$

b.
$$\frac{x}{-2} \leq 5$$
$$(-2)\frac{x}{-2} \geq (-2)5$$
$$x \geq -10$$

c.
$$-3x \geq 21$$
$$-\frac{3x}{3} \leq \frac{21}{3}$$
$$x \leq -7$$

Solve the following inequalities:

1. $y - 18 \leq -3$ ________ **2.** $a + 2 > 10$ ________ **3.** $-8 + m < -4$ ________

4. $-6b \geq 18$ ________ **5.** $\frac{r}{3} > -4$ ________ **6.** $\frac{d}{-8} \leq 5$ ________

7. $x - 5 < 3$ ________ **8.** $-p \leq 5$ ________ **9.** $-\frac{1}{5}y \geq -\frac{3}{5}$ ________

Write and solve an inequality for each problem.

10. A number increased by 5 is at least 8. What is the number? ________________

11. Claire earns $0.12 per paper to deliver the daily newspaper. How many papers must she deliver in order to earn at least $6? ________________

12. Bob can earn no more than $85. How many T-shirts can he sell at $9 per shirt? ________________

13. Katarina has $20 to spend. How many greeting cards can she buy if the cards cost $1.65? ________________

14. Karl earns $4.75 per hour by working at the movie theater. How many full hours does Karl have to work in order to earn $120? ________________

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◆ **Skill B** Solving multistep inequalities

Recall To solve a multistep inequality, first add or subtract, and then multiply or divide.

◆ **Example**

Solve each inequality.

a. $10 - 3x > 28$

b. $8x + 12 < 3x - 8$

◆ **Solution**

a.
$$\begin{aligned} 10 - 3x &> 28 \\ -3x &> 18 \\ x &< -6 \end{aligned}$$

b.
$$\begin{aligned} 8x + 12 &< 3x - 8 \\ 5x + 12 &< -8 \\ 5x &< -20 \\ x &< -4 \end{aligned}$$

Solve the following inequalities:

15. $3y - 1 \leq 14$ ____________

16. $9a + 5 > 77$ ____________

17. $12 - 5m \geq -13$ ____________

18. $\frac{b}{4} - 7 < 8$ ____________

19. $\frac{x}{-2} + 3 \leq -2$ ____________

20. $10p - 11 < 8p + 3$ ____________

21. $5 + 6z \geq 3z - 10$ ____________

22. $2d + 7 > 8d - 5$ ____________

23. $7m - 9 \leq 3m + 7$ ____________

24. $2x - 12 > 6x - 20$ ____________

Write and solve an inequality for each problem.

25. Eight more than 3 times a number is less than –7. What is the range of numbers?

____

26. Sam plans to spend no more than \$20. Juice costs \$2.50 a gallon. If Sam buys snacks for \$8, how many gallons of juice can he buy?

____

27. Sue plans to spend no more than \$50. She buys jeans that cost \$30. If T-shirts cost \$9, how many T-shirts can she buy?

____

28. The Spanish Club wants to have at least 25 bottles of soda for its party. Rafael and Sally have volunteered to bring an equal number of bottles. If the club already has 7 bottles, how many bottles do Rafael and Sally need to bring?

____

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Reteaching
6.3 Compound Inequalities

◆ **Skill A** Graphing a solution to a compound inequality.

Recall There are two basic forms of compound inequalities. The form $a < x < b$ represents all points between a and b on the number line. The form $x < a$ or $x > b$ represents all points to the left of a or to the right of b.

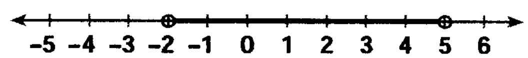
◆ **Example**

Graph each compound inequality on a number line.

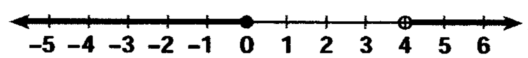
a. $-2 < f < 5$ **b.** $x \leq 0$ or $x > 4$

◆ **Solution**

a. The solution is all real numbers greater than -2 and less than 5. That is, the solution is all points on the number line between -2 and 5. Points at -2 and 5 are not part of the solution set because the inequality symbol does not include equality.

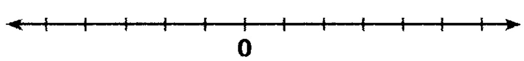


b. The solution is all real numbers that are less than or equal to 0 or all real numbers that are greater than 4. That is, the solution set is all points at or to the left of 0 or all points to the right of 4. Use a closed circle at 0, but use an open circle at 4.

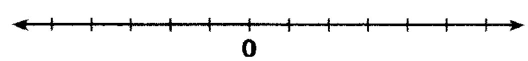


Graph each solution.

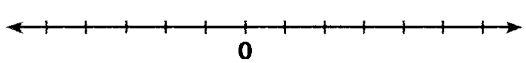
1. $x < -4$ or $x \geq 0$



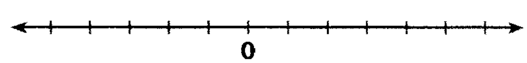
2. $x \leq -4$ or $x > 0$



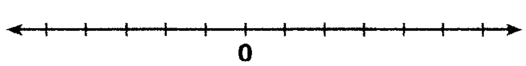
3. $-3\frac{1}{2} < s < 3\frac{1}{2}$



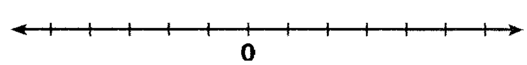
4. $\frac{1}{2} \leq w \leq 4\frac{1}{2}$



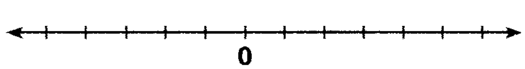
5. $p < -4$ or $p > 4$



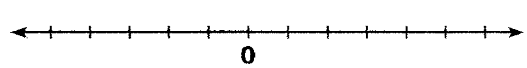
6. $q \leq 3$ or $q \geq 4$



7. $-3.5 \leq d \leq 4\frac{1}{2}$



8. $0 < g \leq 3.0$



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◆ Skill B Solving and graphing a solution to a compound inequality

Recall When you solve a compound inequality, you solve two inequalities and then write the solution to the compound inequality based on the solutions to the individual ones.

◆ **Example 1**

Solve $-3.5 \leq 2t + 2.5 < 6.5$ and graph the solution on a number line.

◆ **Solution**

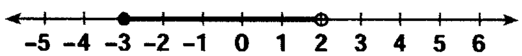
$-3.5 \leq 2t + 2.5 < 6.5$

$-3.5 - 2.5 \leq 2t < 6.5 - 2.5$ Subtract 2.5 from each expression in the inequality.

$-6 \leq 2t < 4$

$3 \leq t < 2$ Divide each expression by 2. You are dividing by a positive number, so keep the inequality symbols as they are.

The solution is all real numbers between -3 and 2, including -3 but not including 2.



◆ **Example 2**

Solve $-5x \leq -15$ or $2x + 3 < 4$ and graph the solution on a number line.

◆ **Solution**

$-5x \leq -15$

$x \geq 3$ Divide each expression by -5. Reverse the inequality symbol.

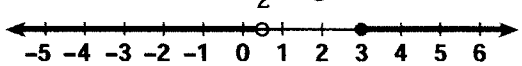
or

$2x + 3 < 4$ Subtract 3 from each expression in the inequality.

$2x < 1$

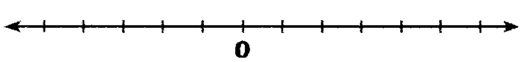
$x < \frac{1}{2}$ Divide each side by 2. Keep the inequality symbol as it is.

The solution is all real numbers less than $\frac{1}{2}$ or greater than or equal to 3.

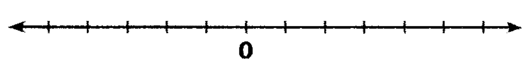


Solve and graph the following compound inequalities:

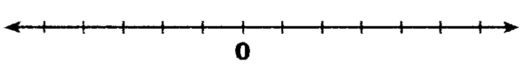
9. $3.5 \leq 2x + 1.5 < 4.5$ __________



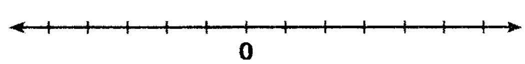
10. $5\frac{3}{5} < 3x + 2\frac{3}{5} < 8\frac{3}{5}$ __________



11. $4x + 3.5 < 3\frac{1}{2}$ or $2x \geq 7$ __________



12. $-2x + 1 \geq 5$ or $-3x \leq 9$ __________



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Reteaching

6.4 *Absolute-Value Functions*

◆ **Skill A** Determining the absolute value of an expression

Recall The absolute value of a given number is the same number when the number is positive or 0. It is the opposite of the given number when the number is negative.

◆ **Example 1**

a. Find $|18|$.

b. Find $|-25|$.

◆ **Solution**

a. $|18| = 18$

b. The opposite of -25 is 25. Thus, $|-25| = 25$.

◆ **Example 2**

Find $|4 - 10|$.

◆ **Solution**

$|4 - 10| = |-6| = 6$

Evaluate.

1. $|8|$ ______________________

2. $|-15|$ ______________________

3. $|12 - 5|$ ______________________

4. $|5 - 12|$ ______________________

5. $|-3 - 6|$ ______________________

6. $|-6 - 3|$ ______________________

7. $|8 - (-8)|$ ______________________

8. $|-8 - 8|$ ______________________

9. $|8 - 8|$ ______________________

10. $|35 - 16|$ ______________________

11. $|16 - 35|$ ______________________

12. $|-(-25) - 15|$ ______________________

13. $|15 - (-25)|$ ______________________

14. $|15 - 25|$ ______________________

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◆ **Skill B** Describing the domain and range of an absolute-value function

Recall The domain of a function is the set of numbers that can be used for the independent variable. The range of a function is the set of numbers that can be used for the dependent variable. When looking at functions, the independent variable is usually x, and the dependent variable is usually y.

◆ **Example 1**

Find the domain and range of $y = 2|x|$.

◆ **Solution**

It is possible to find the absolute value of any real number, so the domain is all real numbers. The absolute value of x is always positive or 0. In this function, every number is multiplied by 2, so this will still result in positive numbers and 0 or all non-negative real numbers.

◆ **Example 2**

Find the domain and range of $y = |x| - 1$.

◆ **Solution**

It is possible to find the absolute value of any real number, so the domain is all real numbers. The range includes -1 because when $x = 0$, $y = -1$. The expression $|x|$ can never be any less than 0 so the range is all numbers greater than or equal to -1, or $y \geq -1$.

Find the domain and range of each function.

15. $y = 5|x|$

____

____

16. $y = |x - 6|$

____

____

17. $y = -3|x|$

____

____

18. $y = |x| - 3$

____

____

19. $y = -|x| + 1$

____

____

20. $y = |x + 5|$

____

____

21. $y = |x| + 6$

____

____

22. $y = |x - 6|$

____

____

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Reteaching

6.5 Absolute-Value Equations and Inequalities

◆ **Skill A** Solving absolute-value equations

Recall To solve absolute-value equations, you must consider two cases.
Case 1: Consider the quantity within the absolute-value sign as positive.
Case 2: Consider the quantity within the absolute-value sign as negative.

◆ **Example 1**

Solve $|x + 1| = 4$.

◆ **Solution**

Case 1: when $(x + 1)$ is positive

$$x + 1 = 4$$
$$x = 3$$

Case 2: when $(x + 1)$ is negative

$$-(x + 1) = 4$$
$$-x - 1 = 4$$
$$-x = 5$$
$$x = -5$$

Thus, $x = 3$ or $x = -5$.

◆ **Example 2**

Solve $|5x + 7| = 42$.

◆ **Solution**

Case 1: when $(5x + 7)$ is positive

$$5x + 7 = 42$$
$$5x = 35$$
$$x = 7$$

Case 2: when $(5x + 7)$ is negative

$$-(5x + 7) = 42$$
$$-5x - 7 = 42$$
$$-5x = 49$$
$$x = -9.8$$

Thus, $x = 7$ or $x = -9.8$.

Solve each equation if possible. Check your answers.

1. $|x + 2| = 10$ ____________ **2.** $|x - 9| = 5$ ____________

3. $|3 - x| = 2$ ____________ **4.** $|x - 12| = 3$ ____________

5. $|5 - x| = 1$ ____________ **6.** $|x + 7| = 18$ ____________

7. $|2x - 1| = 11$ ____________ **8.** $|8 - 3x| = 1$ ____________

9. $|6x + 3| = 27$ ____________ **10.** $|\frac{1}{2}x + 4| = 5$ ____________

11. $|5x - 8| = 12$ ____________ **12.** $|-1 - 4x| = 11$ ____________

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◆ Skill B Solving absolute-value inequalities

Recall When you multiply or divide each side of the inequality by a negative number reverse the inequality symbol.

◆ **Example**

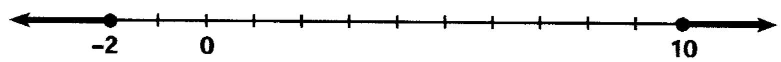
Solve $|4 - x| \geq 6$ and graph the solution on a number line.

◆ **Solution**

Case 1: $4 - x \geq 6$
$-x \geq 2$
$x \leq -2$

Case 2: $-(4 - x) \geq 6$
$-4 + x \geq 6$
$x \geq 10$

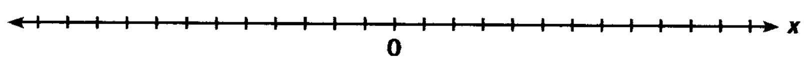
Thus, $x \leq -2$ or $x \geq 10$.



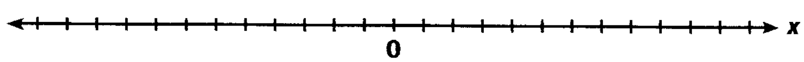
Use shaded circles to show that -2 and 10 are part of the solution.

Solve each inequality and graph each solution on the number line provided.

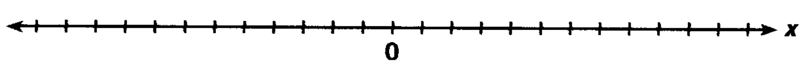
13. $|x - 1| > 8$



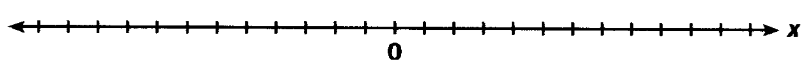
14. $|x + 3| \geq 5$



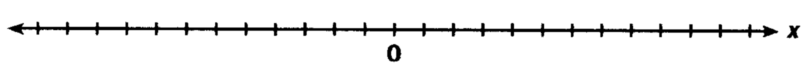
15. $|x - 6| < 2$



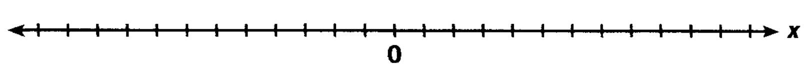
16. $|x + 5| \leq 1$



17. $|2 - x| < 3$



18. $|7 - x| > 3$



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Reteaching
7.5 Systems of Inequalities

◆Skill A Graphing systems of linear inequalities

Recall A system of linear inequalities is graphed in much the same way as a system of equations. Solve each inequality for *y* and then graph the inequalities as solid or dotted lines on the same coordinate plane. Shade the region that contains the solutions to both inequalities.

◆ Example

Graph. $\begin{cases} 3x + y > 8 \\ x + y \leq 4 \end{cases}$

◆ Solution

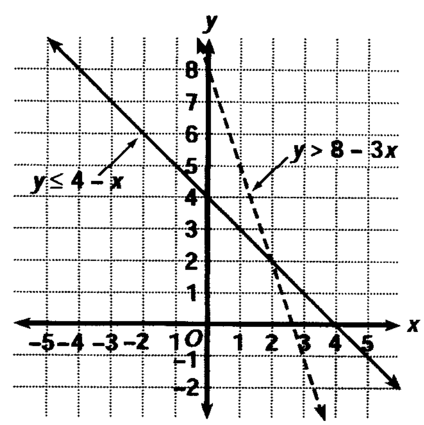
Solve both inequalities for *y*.

$3x - 3x + y > 8 - 3x$	Subtraction Property of Equality
$y > 8 - 3x$	Simplify.
$x - x + y \leq 4 - x$	Subtraction Property of Equality
$y \leq 4 - x$	Simplify.

Graph both inequalities on the same coordinate plane.

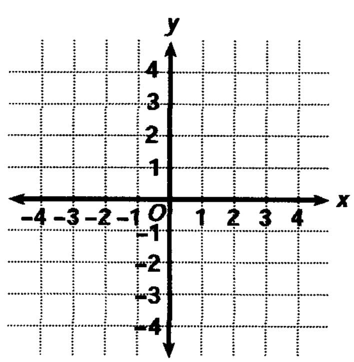
The first line, $y > 8 - 3x$, is dotted because the solutions do not include the line. The other line, $y \leq 4 - x$, is solid because it is included in the solution.

The solutions lie in the shaded region between the two lines and below the point of intersection.

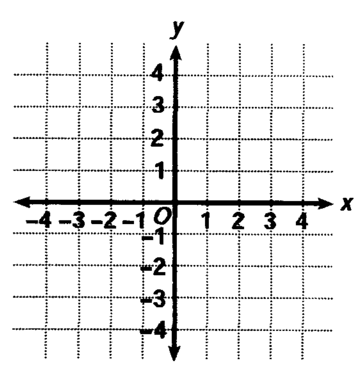


Graph each system of inequalities on the grid provided.

1. $\begin{cases} y < 8x - 4 \\ y > x - 2 \end{cases}$



2. $\begin{cases} y - 2x \geq 3 \\ 2y + x \geq -5 \end{cases}$



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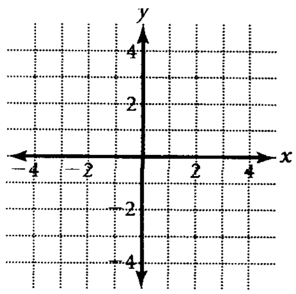
Practice Masters Level A

7.5 *Systems of Inequalities*

Graph each inequality. Determine if the given point is a solution.

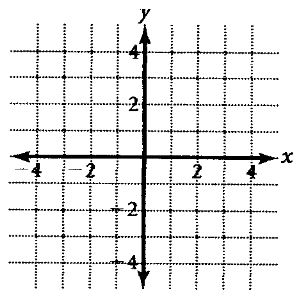
1. $y > 3x + 2$; $(3, 16)$

____



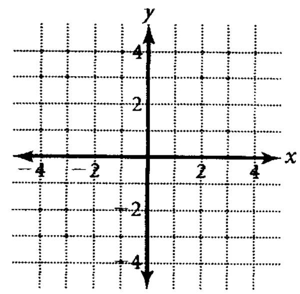
2. $y \leq -x + 4$; $(-1, 0)$

____



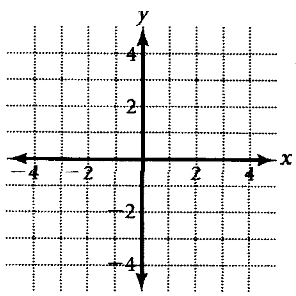
3. $y < 2x + 1$; $(4, -4)$

____



4. $y \geq -4x$; $(3, -4)$

____



5. $y < -2x + 5$; $(0, 0)$

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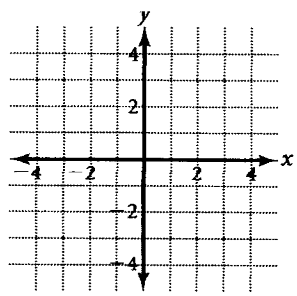

6. $y \geq 4x - 3$; $(-1, 1)$

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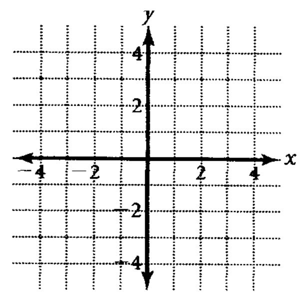

Solve by graphing.

7. $\begin{cases} y < 3x + 8 \\ y > -6x - 3 \end{cases}$

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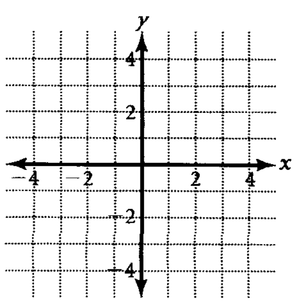

8. $\begin{cases} y > 4x - 7 \\ y < 12 \end{cases}$

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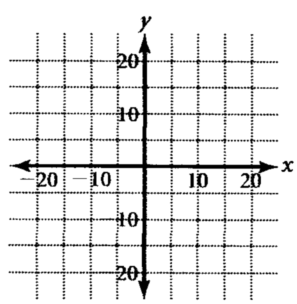

9. $\begin{cases} y \geq -1 \\ y < 2 - x \end{cases}$

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